

Northeast and the Islands Regional Technology in Education Consortium. "Technology and Teaching Children to Read: What Does the Research Say?" Education Development Center, Inc., 2004. 26 June 2010 <http://www.neirtec.org/reading_report/report.htm>.

Provide scaffolds that help students read successfully

A skilled reader uses multiple cues in reading simultaneously --- recognizing familiar words, using word patterns and meanings to group words into meaningful clusters, using prior knowledge and context to understand the meaning of the text, and applying text-comprehension strategies. In learning to read, these processes should be inter-connected; a child should apply phonics in reading text and in writing, learn vocabulary in the context of reading meaningful text, and read fluently in order to comprehend successfully.

As a child is learning, the multifaceted requirements of reading can cause "cognitive overload," in which there are too many competing demands for the child to succeed in reading fluently with comprehension. For example, children who struggle to decode the individual words of a story will devote all of their attention to the individual word level, and therefore be unsuccessful in understanding the events in the story.

Scaffolds for learning to read are analogous to training wheels for a child learning to ride a bicycle. Training wheels let the child experience getting around on a bicycle while focusing on pedaling and steering. Reading scaffolds let children experience interesting stories on their own, while providing opportunities to continue mastering phonics, vocabulary, fluency, and comprehension. Teachers must also make instructional decisions about when to reduce the scaffolding and have children be responsible for reading without them---analogous to deciding when the novice cyclist is ready to try without the training wheels.

Computers can provide powerful scaffolds or "training wheels" for children's reading by presenting information flexibly, assessing students' work, and responding to students. For example, a student with limited phonics skills or vocabulary can benefit from scaffolding in the form of an online dictionary that, at the click of a mouse, can speak the word and display its meaning. Similarly, students who have difficulty chunking sentences into meaningful phrases---a critical component of fluent reading---can have the computer highlight text in meaningful chunks to provide models of how words are grouped for fluent reading. Or a child weak in comprehension strategies can be guided by the computer to pose and answer questions, create concept maps, or check his or her own understanding while reading on-screen text. New technologies enable computers to provide immediate help when children need it in oral reading. The role of the computer is to make individualized, responsive scaffolds available for each child---providing, as close as possible, what a teacher would provide when working individually with a student.

Text Comprehension

Lewin (1997) found that children using electronic talking books were able to read more independently possibly because the computer provided them with cues to cross-check meanings, and the colorful illustrations and animations motivated the children to use the program on their own. The children were also able to develop effective decoding strategies using the various components of the software, allowing them to read more of the text on their own. Electronic books have also been found to have value with older children who have learning disabilities. An early study of this technology found that upper elementary students with learning disabilities could dramatically improve their comprehension and word recognition skills by working with electronic talking books (Olson, Foltz, & Wise 1986); later research found that this held true for many students in need of remedial reading instruction (Wise, Olson, et al 1989; Lewin 1995). Olofsson (1992) found that learning-disabled upper elementary students---particularly those above grade four---improved substantially in overall reading ability after working with software that used synthetic speech.

References:

Lewin, C. (1997). Evaluating talking books: Ascertaining the effectiveness of multiple feedback modes and tutoring techniques. In K. A. H. D. J. L. C. K. Kinzer (Ed.), *Inquiries in literacy theory and practice: Forty-sixth yearbook of the National Reading Conference*. Chicago: National Reading Conference.

Lewin, C. (1995). *The evaluation of talking book software: A pilot study*. London: Centre for Information Technology in Education, The Open University.

Olofsson, A. (1992). Synthetic speech and computer aided reading for reading disabled children. *Reading and Writing: An Interdisciplinary Journal*, 4, 165-178.

Olson, R. K., Foltz, G., & Wise, B. W. (1986). Reading instruction and remediation with the aid of computer speech. *Behavior Research Methods, Instruments, and Computers*, 18, 93-99.

Wise, B., Olson, R., Anstett, M., Andrews, L., Terjak, M., Schneider, V., Kostuch, J., & Kriho, L. (1989). Implementing a long-term remedial reading study in the public schools: hardware, software, and real-world issues. *Behavior Research Methods & Instrumentation*, 21, 173-180.

Higgins, E. L., & Raskind, M. H. (1997). The compensatory effectiveness of optical character Recognition/Speech synthesis on reading comprehension of postsecondary students with learning disabilities. *Learning Disabilities: A Multidisciplinary Journal*, 8(2), 75-87. [Online] Text to Speech | National Center on Accessible Instructional Materials. 26 June 2010 <http://aim.cast.org/learn/research/aimresearch/accessible_instructional_materials/sr_text-to-speech>.

We were interested in whether reading comprehension scores of children with LD would improve when using the technology as compared to reading without the technology. As previously suggested, OCR and speech synthesis may enable students with reading disabilities to bypass their phonological difficulties by hearing the printed word, and which may in turn enhance text comprehension. In the event that comprehension scores improved, we were also interested in determining whether the "interference effect" found in the previous studies would be present, since this handheld unit would be used to read aloud only single words rather than connected text.

Results of the study indicated that students with reading disabilities aged 10 to 18 performed significantly better in reading comprehension tasks when using the device as compared to reading without it. Furthermore, unlike previous studies, this research did not indicate an "interference effect" for the readers with less severe deficits. This result is probably due to the fact that the reading pen user only scanned difficult words on an "as needed" basis, unlike the desktop unit user, to whom entire passages of text were read aloud, whether or not the user needed help with every word.